Principles of Measurement and Assessment

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Overview of today’s topics

• Review the purpose of assessments
• Reconsider the importance of learning outcomes
• Think about curriculum sequencing and structure
• Discuss tactics/techniques for designing assessments
• Consider the variety of assessment tools available
• Introduction to standard setting
Purpose of Assessment

Assessment should drive learning and be based on the intended outcomes of the curriculum

• **FOR** learning
  – Is the learner progressing? Are they ready to progress to next level?
  – Sets educational goals, can drive discovery and improvement

• **OF** learning
  – Did the learner make progress against targeted outcomes and criterion-referenced standards?
  – Does the curriculum meet the targets for accreditation, graduation etc.
Purpose of Assessment

• **Formative (typically norm-based)**
  - Gather information during course to give feedback of learners’ strengths/weaknesses with respect to learning objectives
  - Consequences are typically low- “Low stakes”

• **Summative (typically criteria-based)**
  - Measure learner’s achievement at end of learning cycle, and compare to standard/benchmark
  - “Moderate” to “high stakes”

• **Administrative / Compliance / Process Improvement**
  - Gather data to evaluate gap / needs assessment (not associated with education)
Challenges with assessments

• If you are the learner??
  – Vulnerability
  – Study for the test, not for a broader understanding
  – “Fairness” of the grade
  – ??

• If you are the faculty??
  – Time consuming
  – Am I really assessing the right thing?
  – Can I measure what I am trying to “see”? 
  – Inter-rater reliability
  – Bias
  – ??
Quick reminder about ILOs

Cognitive = Knowledge (K)
Psychomotor = Skills (S)
Affective = Attitude (A)

Matching Teaching Methods to ILOs

Table 5.2 Matching Educational Methods to Objectives*

<table>
<thead>
<tr>
<th>Educational Method</th>
<th>Cognitive: Knowledge</th>
<th>Cognitive: Problem-Solving</th>
<th>Affective: Attitudinal</th>
<th>Psychomotor: Skills or Competence</th>
<th>Psychomotor: Behavioral or Performance</th>
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<tbody>
<tr>
<td>Lectures</td>
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<td>Team-based learning</td>
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*Kern et al.  *Curriculum Development for Medical Education: A six-step Approach.* Johns Hopkins University School of Medicine, Baltimore, MD.
6 Steps:
1. Problem Identification
2. Needs Assessment
3. Goals and Objectives
4. Educational Strategy
5. Implementation
6. Evaluation and Feedback
How to design assessments

Review the curriculum learning outcomes
• Decide on domains of skills to be tested
• Map the domains against the learning objectives
• Sampling: decide on the proportion of questions in each section
• Calculate your total testing time; ensure appropriate time is allowed for the task

Assessment Tools—
KNOWLEDGE TESTS: Multiple choice questions
SKILL CONFIRMATION: Simple checklists during a procedure, OSCEs
ATTITUDE/ATTRIBUTES: Self-reflection essays, near peer evaluations of team-work
"Blueprinting"

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<td>Courses/Clinicals</td>
<td>Simple check mark</td>
<td>Numbers of questions on in this area for the MCQ</td>
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Standard setting

• Norm-referenced (relative)
  – Fixed proportion of examinees are required to pass
  – If the whole cohort is exceptional, some competent learners may fail

• Criterion-referenced (absolute)
  – Focused on the desirable competency level that each student should achieve
  – Possible for all students to pass (or fail)
Challenges of Standard Setting

• Faculty and/or organizational decision, meaning there is a ‘judgment’
• Subjective nature of the standard setting
• Defining a ‘minimally competent’ student
  – How to remediate ‘borderline’ performers
• Variability of cut scores....where’s the line?
• Training the judges
• Validity and reliability